after reoperative CABG[2] is indeed analogous (or similar) to that we reported previously after primary CABG.[3] In that respect, we believe that the reported survival comparisons, derived for a general cardiac surgical population (as opposed to selected randomized, controlled trials), are rather self-explanatory and were based on rigorous analyses applying propensity modeling and matching methods.

Nezic and colleagues asserted that the reported comparative RA and SV patency data in the literature do not support the contention that the observed survival benefit is the result of RA patency being superior to that of SV.[1] Here, we believe that it is appropriate to warn against an imbalanced choice of cited literature. Specifically, Nezic and colleagues[1] cited only articles suggesting that RA and SV exhibit similar late patency,[4-6] ignoring any other data that showed superior RA patency.[7] Interestingly, no studies of superior SV to RA patency were cited in their letter. Also, any discussion of SV graft durability should not ignore the sobering SV patency results reported in the PREVENT IV Trial.[8] Finally, we do agree that providing patency data that parallel the survival data findings would be an important addition to some of the survival analyses reported by us and by others. At the same time, we believe that rigorous analyses showing, in the general cardiac surgical population, compelling data regarding the potential survival advantage when RA is used as a second arterial conduit in CABG should not be glossed over.

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CONTRAST MEDIA DOSE, ANGIOGRAPHY TIMING, AND ACUTE RENAL FAILURE AFTER CORONARY OPERATIONS

To the Editor:

We read with interest the recent article of Medalion and coworkers titled ''The Effect of Cardiac Angiography Timing, Contrast Media Dose, and Preoperative Renal Function on Acute Renal Failure After Coronary Artery Bypass Grafting.''[1] The authors found that both high contrast dose at angiography (>1.4 mL/kg), and an operation done up to 5 days after angiography were independent risk factors for postoperative acute renal failure (ARF) in patients who underwent coronary artery bypass grafting.

The authors found partially different results with respect to a similar study that we published in 2008.[2] In that study, we identified that an operation done on the same day as the angiogram was an independent risk factor for ARF after surgery. A high contrast dose (>1.36 mL/kg) was univariately but not independently associated with ARF. Medalion and coworkers[1] hypothesized that this partial discrepancy may result from the dichotomization of the contrast dose based on the median value (whereas they used the upper quartile) and the use of peak creatinine for the definition of ARF (peak creatinine twice the baseline value and >2 mg/dL), whereas they used a 25% decrease of estimated creatinine clearance and creatinine clearance of 60 mL/min or less on day 3.

We think that the main difference between the 2 studies is the definition of ARF. Medalion and coworkers[1] used a more liberal definition (stage 1 of the RIFLE [risk, injury, failure, loss, end-stage kidney disease] criteria)[3] and ended up with a quite high ARF rate (13.6%), whereas our definition was more restrictive (stage 2 of the RIFLE criteria) and led to an ARF rate of 5.7%. Of course, a multivariable analysis with more events as the outcome variable is more likely to accept more independent variables. To check for this hypothesis, we have reanalyzed our data using the same liberal definition of ARF dichotomizing the contrast dose at the upper quartile of the distribution (1.7 mL/kg).

The results of this new analysis are reported in Table 1. A high dose of contrast agent is now an independent risk factor for ARF. However, only operations done on the same day as the angiogram carry an independent association with ARF. Therefore, the discrepancy between our study and the one of Medalion and coworkers[1] remains, with respect to the ''safe'' time that should be applied between the angiogram and the operation. It is certain that contrast-induced

TABLE 1. Acute renal failure risk

Factor	Regression coefficient	Odds ratio (95% CI)	*P* value
Constant	–4.16		
Angiography on the operation day	0.702	2.02 (1.07–3.8)	.030
Age (y)	0.047	1.05 (1.02–1.08)	.001
Ejection fraction (%)	–0.040	0.96 (0.94–0.98)	.001
CPB duration (min)	0.016	1.016 (1.01–1.02)	.001
High contrast dose	0.592	1.81 (1.01–3.23)	.045

CI, Confidence interval; *CPB*, cardiopulmonary bypass.

nephropathy peaks 3 to 5 days after contrast administration, in the usual ''noncardiac surgical'' clinical model. However, we must consider that the cardiac operation may introduce important changes, with the widely known detrimental effect of cardiopulmonary bypass, hemodilution, loss of pulsatility, and possible low cardiac output state on renal function. All these factors may certainly change the time-related onset of a contrast-induced nephropathy, and it is surprising that cardiopulmonary bypass time is not an independent risk factor for ARF in the authors' model.

Nevertheless, we believe that this study offers an important clinical message, highlighting the deleterious renal effects of a high contrast dose and a short interval of time between the angiogram and the coronary operation.

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Reply to the Editor:

It is with pleasure that I respond to Ranucci and Ballotta regarding the article ''The Effect of Cardiac Angiography Timing, Contrast Media Dose, and Preoperative Renal Function on Acute Renal Failure After Coronary Artery Bypass Grafting.''[1] Indeed, the studies of Ranucci,[2] Del Duca,[3] and their associates served in part as the trigger for our study. In their original article, Ranucci and associates[2] identified operation done on same day as the angiogram to be an independent risk factor for acute renal failure (ARF). However, contrast dose greater than 1.36 mL/kg did not turn out to be an independent risk factor. The prevalence of ARF in their series was 5.7% (based on ARF definition of peak creatinine twice the baseline value and >2 mg/dL). In our study,[1] ARF was present in 13.6% (based on ARF definition of 25% decrease of estimated creatinine clearance and creatinine clearance [eClCr] of 60 mL/min or less on day 3), and both contrast dose greater than 1.4 mL/kg, and operation up to 5 days after angiography turned out to be independently associated with ARF. Ranucci and Ballotta hypothesized that the differences are secondary to different ARF definitions, and they reanalyzed their data with a more liberal definition of ARF and higher contrast dose. Now, contrast dose turned out to be an independent predictor of ARF, but operation performed later than the same day as the angiogram failed to show any independent association with ARF. Inasmuch as the definition of ARF is not standardized, I agree that it is difficult to compare different studies with different definitions. Warnock,[4] in a recent editorial, challenges the subject and call for standardization. Ranucci and Ballotta are to be congratulated for reanalyzing their data with ARF definition close to the one my colleagues and I used (although not similar, inasmuch as we used eClCr and they used creatinine for definition). Differences in definition remain an issue, although I believe other factors may influence the differences between the results. As we discussed in our manuscript, we studied isolated first time coronary artery bypass grafting only, in contrast to Ranucci and associates,[2] who included several types of operations in their study, including reoperations, valve surgery, and other operations that were already identified elsewhere as risk factors for development of ARF. Some of those more complex operations are associated with multiple comorbidities and end up usually with longer cardiopulmonary bypass time that may be a marker of complexity. This may explain why we did not identify cardiopulmonary bypass as a predictor of ARF. Those more complex cases and other cases in which ARF developed as part of a broader multiorgan failure (sepsis, low cardiac output, and others) are not directly related to time after angiography but are captured as such owing to the use of peak creatinine as the reference point for ARF definition. We elected to use creatinine on postoperative day 3 as the reference point to try to minimize capturing ARF not related directly to timing of angiography. It is also of interest that in the Ranucci study, diabetes and preoperative renal failure were not associated with postoperative ARF (both variables are strongly associated with